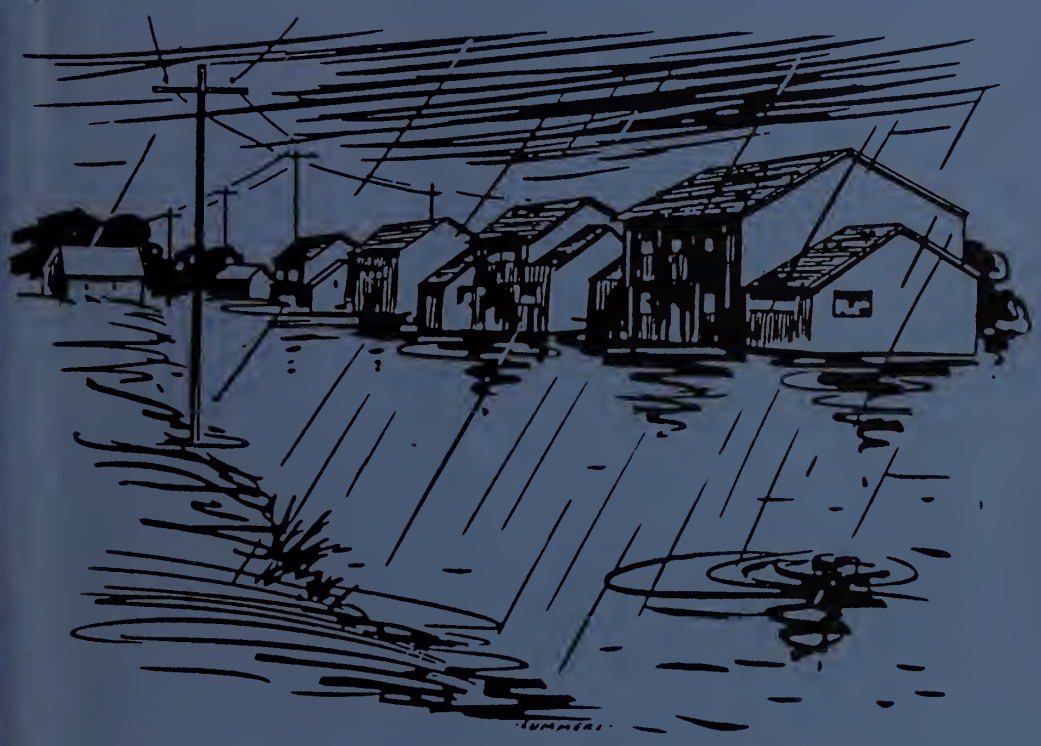
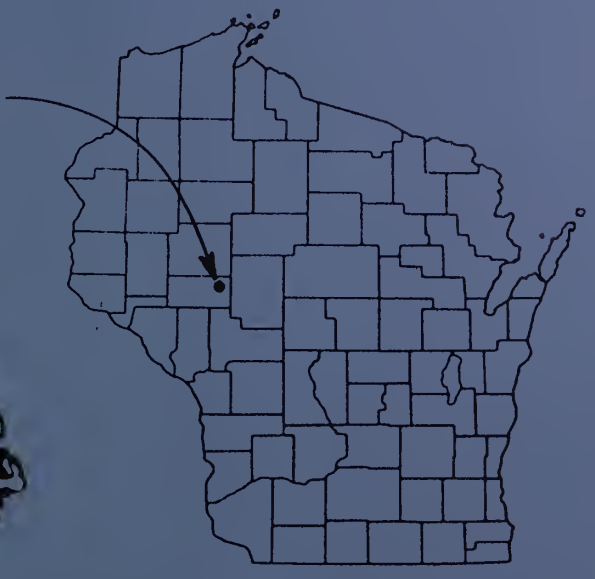
FLOOD PLAIN MANAGEMENT STUDY

LAKE EAU CLAIRE

EAU CLAIRE COUNTY, WISCONSIN





PREPARED BY THE

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

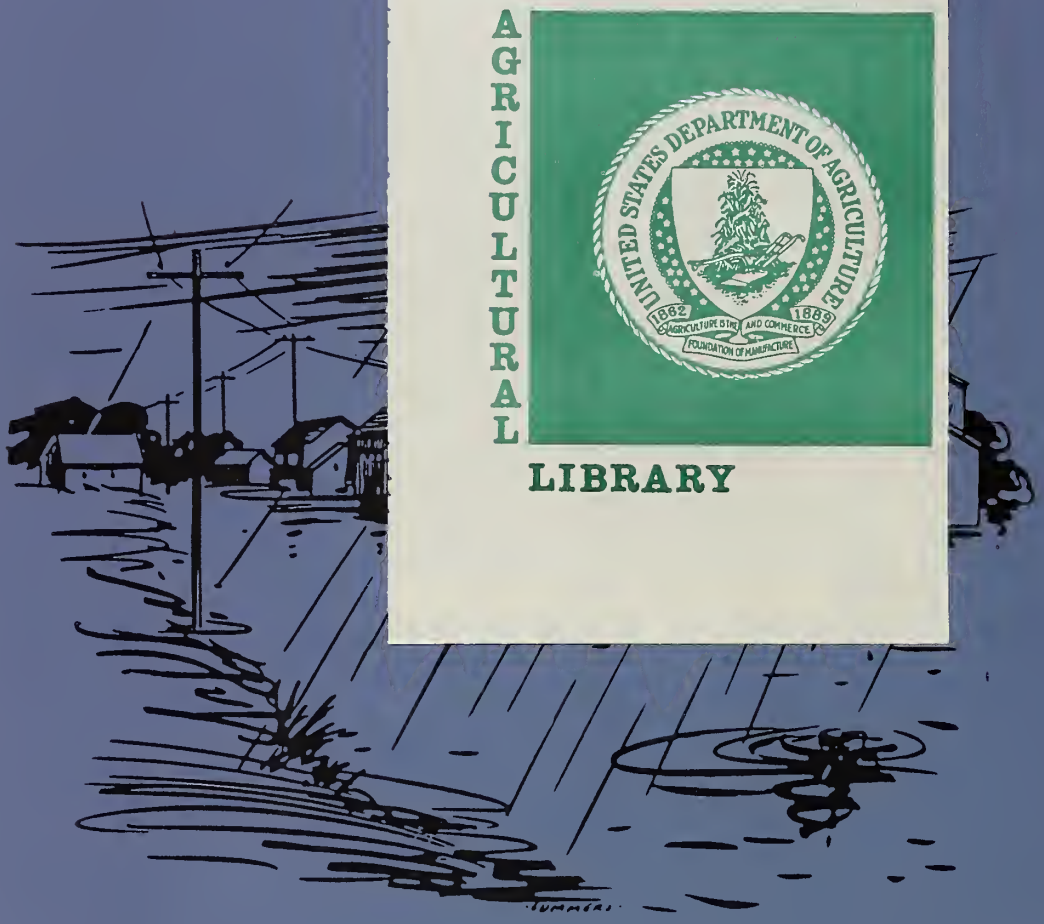
MADISON, WISCONSIN

IN COOPERATION WITH

THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES

APRIL 1984

FLOOD PLAIN MANAGEMENT STUD



PREPARED BY THE

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

MADISON, WISCONSIN

IN COOPERATION WITH

AND THE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Table of Contents

Appendices

Lake Eau Claire Flood Plain Management Study

Introduction

The purpose of this study is to define the flood characteristics of Lake Eau Claire. Eau Claire County requested the study through the Wisconsin Department of Natural Resources (DNR). The information acquired will enable them to develop an effective flood plain management program.

This report is prepared for use by the local people in planning the use and regulation of the Lake Eau Claire flood plain in Eau Claire County.

The 100-year flood plain has been delineated. The high water elevations and flood plain are based on 5-year projected land use of the watershed, stream, flood plain, and existing road crossings.

The Soil Conservation Service carries out flood hazard studies in accordance with Federal Level Recommendation 3 of "A Unified National Program for Flood Plain Management," and Section 6 of Public Law 83-566. The principles contained in Executive Order 11988, Flood Plain Management, are addressed in this part.

In Wisconsin, the Soil Conservation Service coordinates flood plain management studies with the Wisconsin DNR, through a joint coordination agreement entered into in October 1978. The Wisconsin Water Resources Act (Chapter 614, Laws of Wisconsin, 1965) authorizes the DNR, Division of Enforcement, to establish and upgrade minimum standards for flood plain regulations.

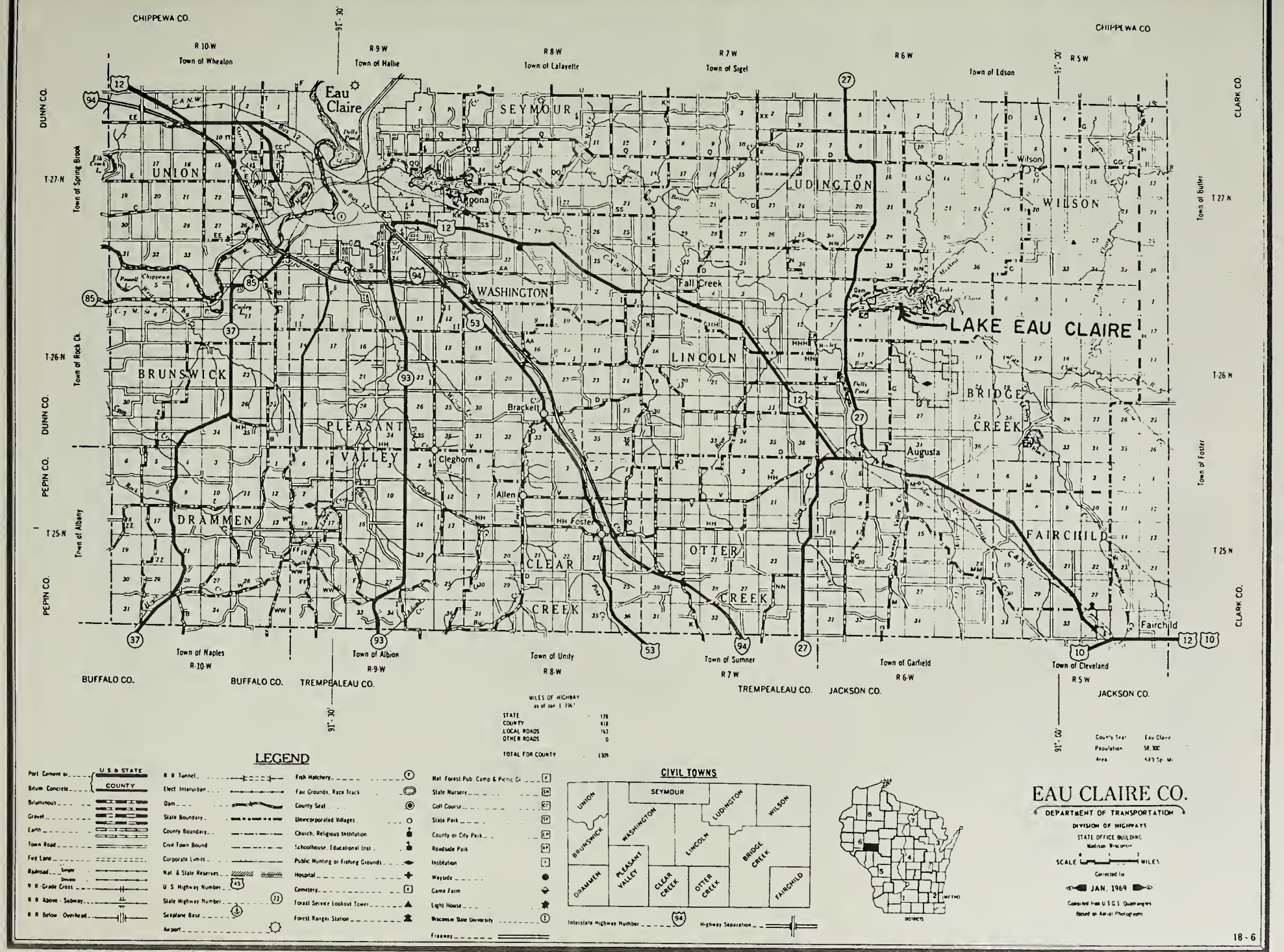
Study Area Description

The study area is located in east central Eau Claire County on the Eau Claire River. The dam creating the lake is approximately one quarter mile east of state highway 27 and five miles north of the City of Augusta. Approximately three quarters of a mile of river channel exists upstream of the dam before opening up into the lake proper. The study extends approximately two and one half miles from the dam up the lake to just beyond the boat ramp on the south shore. Hay Creek and Muskrat Creek were studied to approximately one third mile from the lake shore upstream.

The drainage area to the dam is 587.7 square miles. Hay Creek has a drainage area of 36.5 square miles. Muskrat Creek has a drainage area of 33.9 square miles. Lake Eau Claire is in USGS Hydrologic Unit 07050006 (Eau Claire River).

The climate is typically continental. January temperatures average 12° F. July, the warmest month, has an average temperature of 70° F. Precipitation averages 32 inches per year.

The soils of the watershed consist of the following: Menahga-Plainfield association: Excessively drained sands and loamy sands that are underlain by loamy sand and sand on stream terraces. Ludington-Elm Lake-Fairchild association: well drained to poorly drained loamy sands that are underlain by loamy sand, sand, loam, and sandstone or sandstone and shale on the eastern uplands.


CHIPPEWA CO.
CHIPPEWA CO
R 10-W
Town of Wheaton
R 9-W
Town of Hallie
R 8-W
Town of Lafayette
R 7 W
Town of Siget
R 6 W
Town of Edson
R 5 W
91° 30'
91° 15'
DUNN CO.
CLARK CO.
PEPIN CO.
T 27 N
T 26 N
T 25 N
Town of Spring Brook
Town of Rock Ck.
Town of Albany
Town of Butler
Town of Foster
Eau Claire
SEYMOUR
UNION
LUDINGTON
WILSON
Wilson
Augusta
Fall Creek
WASHINGTON
LAKE EAU CLAIRE
LINCOLN
BRUNSWICK
BRIDGE CREEK
Brackett
PLEASANT VALLEY
Cleghorn
Allen
Foster
DRAMMEN
FAIRCHILD
Fairchild
OTTER CREEK
CLEAR CREEK
Town of Naples
R-10-W
Town of Albion
R-9-W
Town of Unity
R 8-W
Town of Sumner
R 7 W
Town of Garfield
R 6-W
Town of Cleveland
R 5 W
BUFFALO CO.
BUFFALO CO.
TREMPEALEAU CO.
TREMPEALEAU CO.
JACKSON CO.
JACKSON CO.
MILES OF HIGHWAY
as of Jan 1 196
STATE 128
COUNTY 818
LOCAL ROADS 163
OTHER ROADS 0
TOTAL FOR COUNTY 1309
County Seat Eau Claire
Population 58,300
Area 649 Sq. Mi.
LEGEND
U.S. & STATE
COUNTY
Port. Cement or Bitum. Concrete
Bituminous
Gravel
Earth
Town Road
Fire Lane
Railroad
R R Grade Cross
R R Above - Subway
R R Below - Overhead
R R Tunnel
Elect. Interurban
Dam
State Boundary
County Boundary
Civil Town Bound
Corporate Limits
Nat. & State Reserves
U S Highway Number
State Highway Number
Seaplane Base
Airport
Fish Hatchery
Fair Grounds, Race Track
County Seat
Unincorporated Villages
Church, Religious Institution
Schoolhouse, Educational Inst.
Public Hunting or Fishing Grounds
Hospital
Cemetery
Forest Service Lookout Tower
Forest Ranger Station
Nat. Forest Pub. Camp & Picnic Gr.
State Nursery
Golf Course
State Park
County or City Park
Roadside Park
Institution
Wayside
Game Farm
Light House
Wisconsin State University
Freeway
CIVIL TOWNS
UNION
SEYMOUR
LUDINGTON
WILSON
WASHINGTON
BRUNSWICK
LINCOLN
BRIDGE CREEK
PLEASANT VALLEY
CLEAR CREEK
OTTER CREEK
DRAMMEN
FAIRCHILD
Interstate Highway Number 94
Highway Separation
DISTRICTS
EAU CLAIRE CO.
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OFFICE BUILDING
Madison Wisconsin
SCALE
MILES
Corrected to
JAN. 1969
Compiled from U S G S Quadrangles
Based on Aerial Photographs
18-6
EAU CLAIRE

2

The Fallcreek-Cable association: somewhat poorly drained and poorly drained sandy loams and loams that are underlain by loamy material and sand loam or loam glacial till on the glacial uplands of Hay Creek, Muskrat Creek, and the north fork Eau Claire River.

Natural and Beneficial Flood Plain Values

Lake Eau Claire is the largest single body of water in Eau Claire County (1118 acres). The most common sport fish species are walleye, muskellunge, largemouth bass, smallmouth bass, perch, bluegill, and black crappies.

About 10 acres of marshy wetlands provide habitat for muskrats, nesting mallards, blue-winged teal and wood ducks. Other ducks, coots, and, occasionally, Canada geese also use the lake during migratory seasons.

Most of the lake shore vegetation is oak and conifer upland.

By keeping the flood plain in this natural vegetation, several positive values will be maintained. A natural buffer area around the lake will help prevent shoreline erosion and provide beauty and wildlife habitat. Protected areas will help filter runoff, will help with noise absorption, and will provide privacy for the dwellings around the lake.

Flooding Problems

The Eau Claire River has experienced numerous flood events since the gage was installed at Fall Creek in 1943 (See Appendix F). Thirteen floods exceeding 10,000 cfs have occurred. The date, rating, and discharge as measured at the Fall Creek Gage and a brief damage description of the five largest floods are as follows: on 4/03/52 (5th) the discharge was recorded at 15,700 cfs but caused little or no damage to any of the homes or cabins surrounding the lake. There was minor damage to docks and shoreline. On 5/30/55 (3rd) the discharge was recorded as 17,200 cfs and the water was high enough to enter basements of several homes and cottages. It also destroyed numerous docks and two boat houses. There was considerable shoreline erosion along the high sand banks. On 3/31/67 the largest of record, the discharge was 20,500 cfs. This flood was the most damaging of all. There was water above the first floor level of several homes. Some wells and sewage systems were under water. There was considerable damage to the shoreline, trees, shrubs, docks, and boat houses by the ice which was still in the lake. On 3/12/73 (4th) the discharge was 16,400 cfs. This flood had impacts similar to the 1955 flood. On 9/12/80 (2nd) the discharge was 19,700 cfs. This flood was not quite as severe as the flood of 1967. Water did not reach the height of the first floor of the buildings, but there was basement flooding. Damage occurred to docks, boats, and boat houses. The high sand banks suffered severe water erosion.

Existing Flood Plain Management

Eau Claire County has a flood plain zoning ordinance but does not have adequate flood plain delineations around Lake Eau Claire. Eau Claire County is in the regular Flood Insurance Program. Eau Claire County has an emergency action plan for the dam that is coordinated with the Eau Claire County Emergency Services and Safety Department.

Alternatives for Mitigating Flood Damages to Existing and Future Development

A. The county will incorporate the flood plain maps from this study into their flood plain ordinance and continue enforcement.

B. Apply existing standards set forth in the county's subdivision control ordinance to regulate development in nonsuitable areas and minimize erosion and diffused surface water runoff within the watershed.

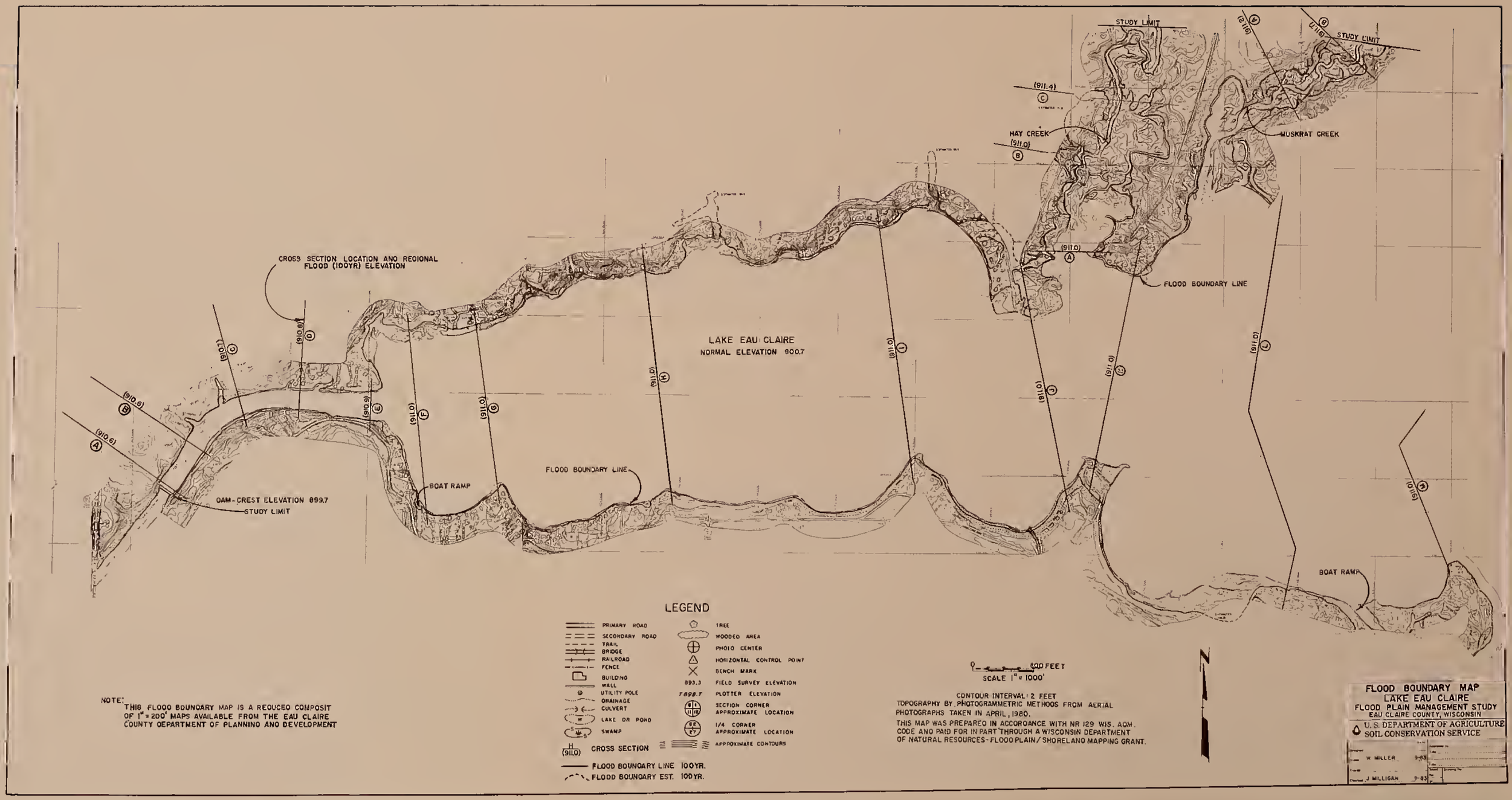
C. Establish conservancy districts for those areas highly conducive to erosion and unsuitable for development.

D. Relocate and/or flood-proof those existing homes in the flood plain by elevating, filling basements, and providing dry land access during floods. Thirteen homes or cottages could be included in this alternative.

E. Stabilize the lakeshore to minimize the potential damage by use of riprap or other acceptable means.

Appendix A

FLOOD BOUNDARY MAPS



NOTE: THIS FLOOD BOUNDARY MAP IS A REDUCED COMPOSIT OF 1" = 200' MAPS AVAILABLE FROM THE EAU CLAIRE COUNTY DEPARTMENT OF PLANNING AND DEVELOPMENT

CONTOUR INTERVAL: 2 FEET
TOPOGRAPHY BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS TAKEN IN APRIL, 1980.
THIS MAP WAS PREPARED IN ACCORDANCE WITH NR 129 WIS. ADM. CODE AND PAID FOR IN PART THROUGH A WISCONSIN DEPARTMENT OF NATURAL RESOURCES - FLOOD PLAIN / SHORELAND MAPPING GRANT.

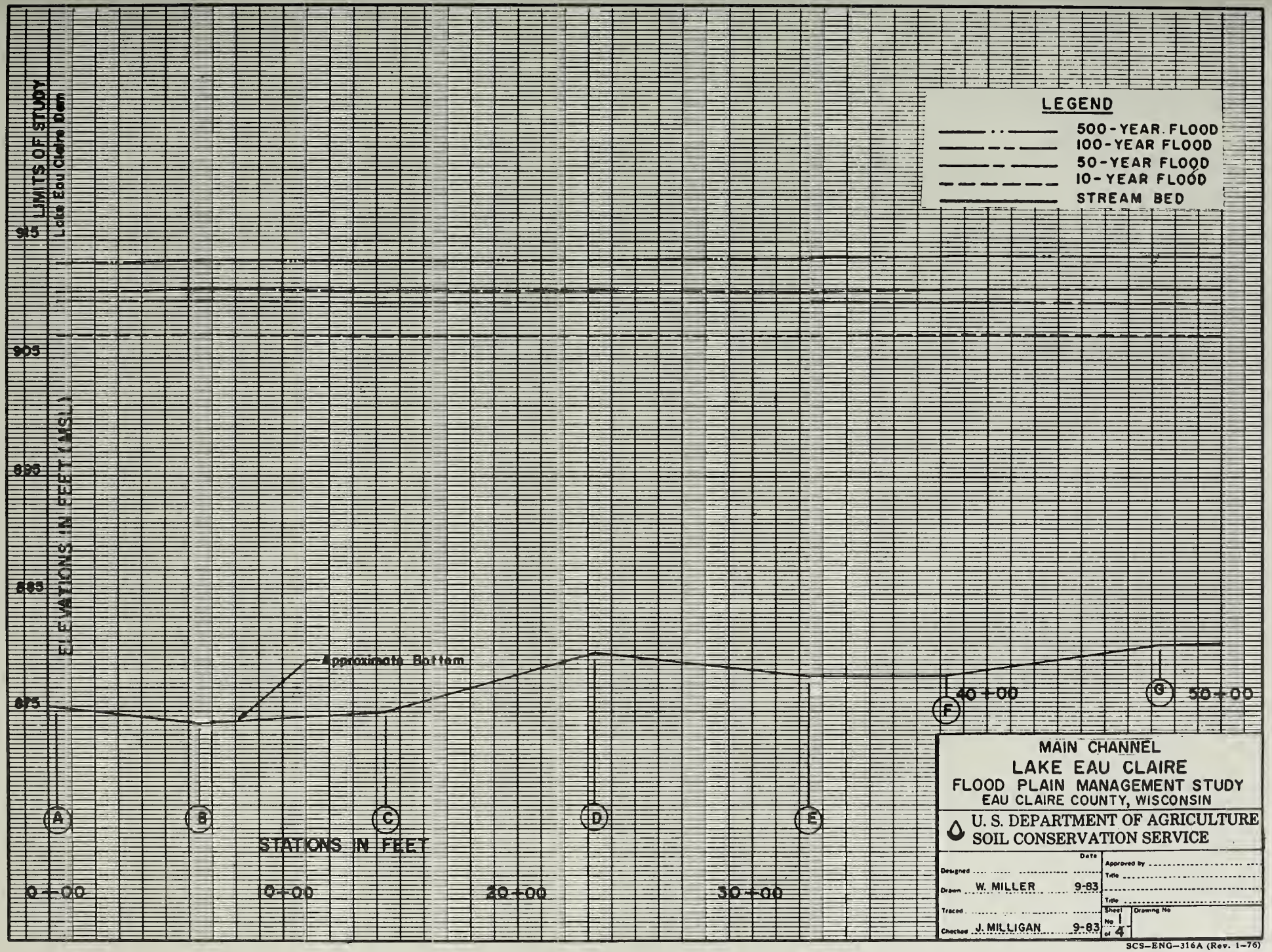
FLOOD BOUNDARY MAP
LAKE EAU CLAIRE
FLOOD PLAIN MANAGEMENT STUDY
EAU CLAIRE COUNTY, WISCONSIN

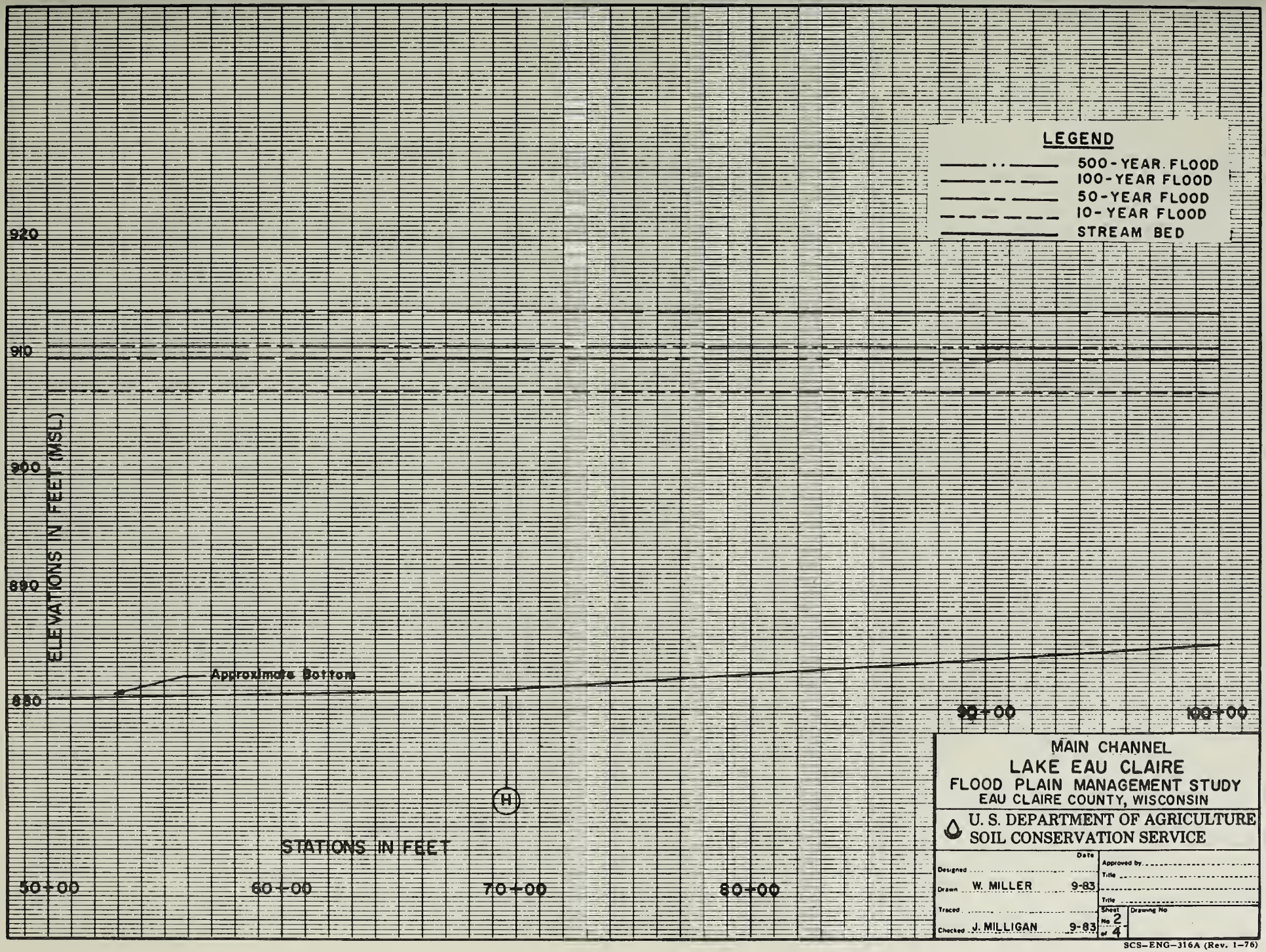
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	W MILLER	9-83
	J MILLIGAN	9-83

Appendix B

FLOOD PROFILES


LIMITS OF STUDY
Lake Eau Claire Dam
ELEVATION IN FEET (MSL)
915
905
895
885
875
Approximate Bottom
LEGEND
500-YEAR FLOOD
100-YEAR FLOOD
50-YEAR FLOOD
10-YEAR FLOOD
STREAM BED
A
B
C
D
E
F
G
40+00
50+00
STATIONS IN FEET
0+00
10+00
20+00
30+00
MAIN CHANNEL
LAKE EAU CLAIRE
FLOOD PLAIN MANAGEMENT STUDY
EAU CLAIRE COUNTY, WISCONSIN
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Designed
Drawn W. MILLER 9-83
Traced
Checked J. MILLIGAN 9-83
Date
Approved by
Title
Sheet No 1 of 4
Drawing No
SCS-ENG-316A (Rev. 1-76)


LEGEND
500-YEAR FLOOD
100-YEAR FLOOD
50-YEAR FLOOD
10-YEAR FLOOD
STREAM BED
920
910
900
890
880
ELEVATIONS IN FEET (MSL)
Approximate Bottom
H
STATIONS IN FEET
50+00
60+00
70+00
80+00
90+00
100+00
MAIN CHANNEL
LAKE EAU CLAIRE
FLOOD PLAIN MANAGEMENT STUDY
EAU CLAIRE COUNTY, WISCONSIN
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Designed
Drawn W. MILLER 9-83
Traced
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Date
Approved by
Title
Title
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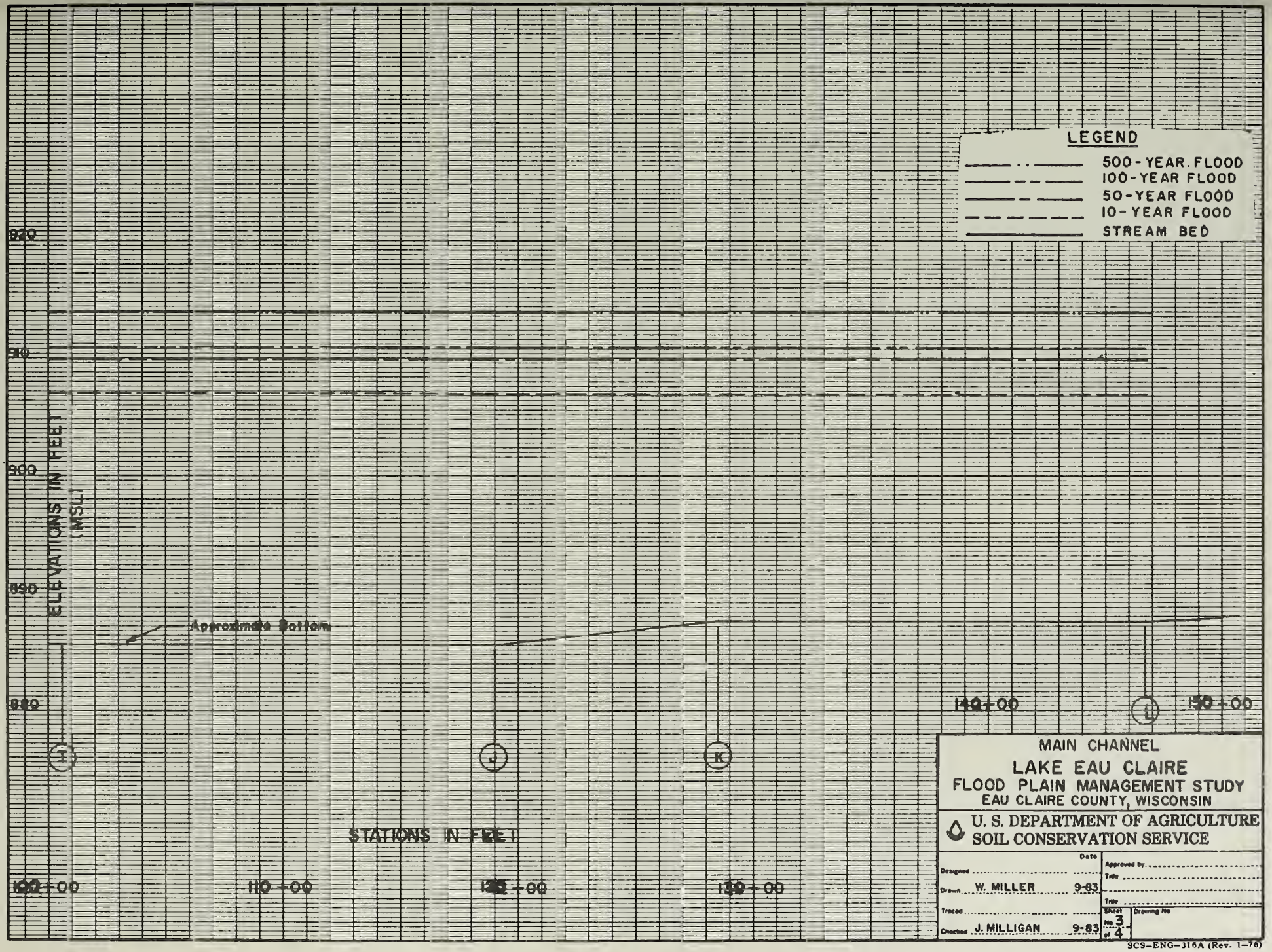
LEGEND
500-YEAR FLOOD
100-YEAR FLOOD
50-YEAR FLOOD
10-YEAR FLOOD
STREAM BED
920
910
900
890
880
ELEVATIONS IN FEET (MSL)
Approximate Bottom
I
J
K
L
140+00
150+00
110+00
130+00
STATIONS IN FEET
MAIN CHANNEL
LAKE EAU CLAIRE
FLOOD PLAIN MANAGEMENT STUDY
EAU CLAIRE COUNTY, WISCONSIN
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Designed
Drawn W. MILLER 9-83
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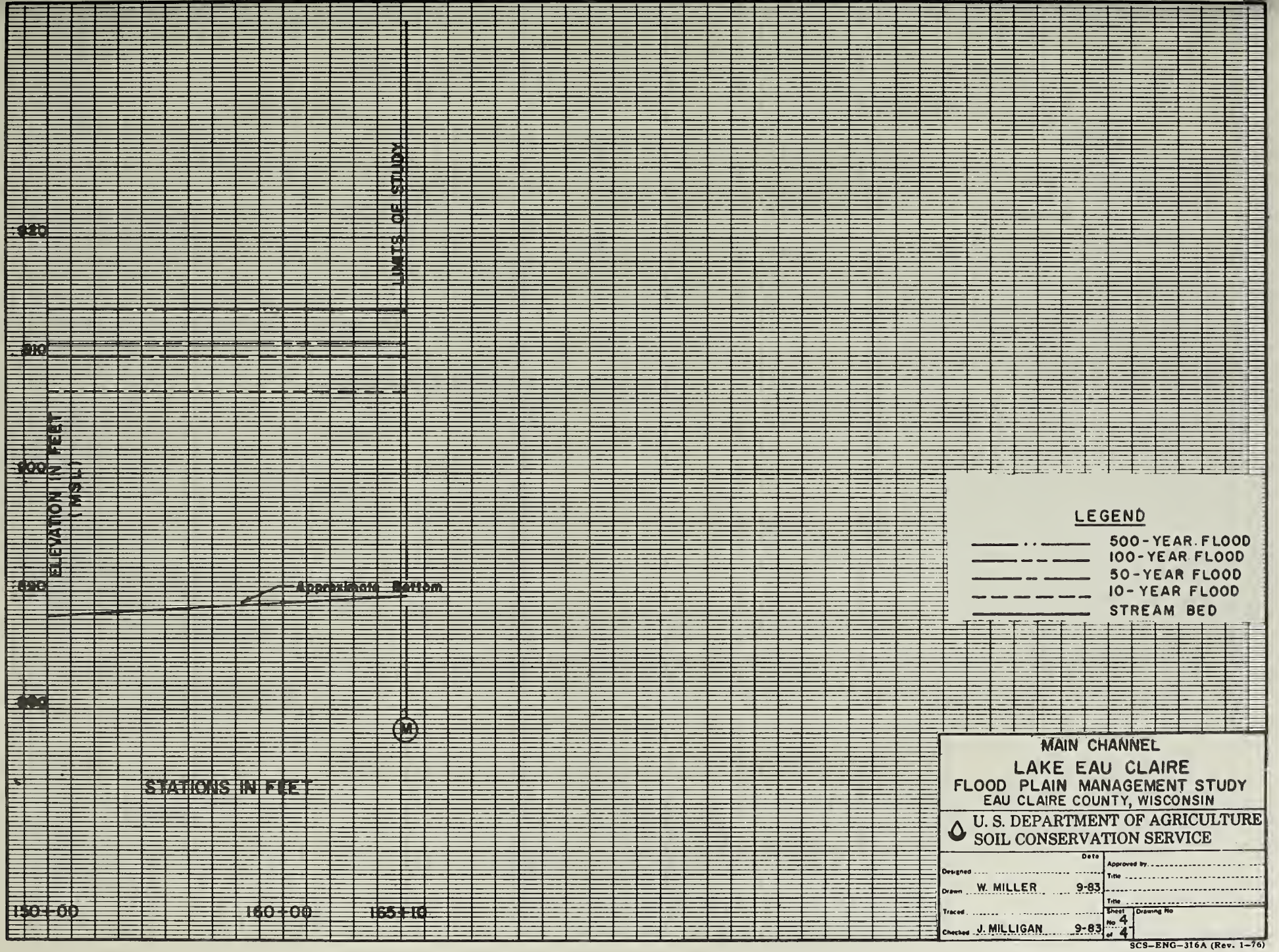
LIMITS OF STUDY
ELEVATION IN FEET (MSL)
Approximate Bottom
STATIONS IN FEET
150+00
160+00
165+10
LEGEND
500-YEAR FLOOD
100-YEAR FLOOD
50-YEAR FLOOD
10-YEAR FLOOD
STREAM BED
MAIN CHANNEL
LAKE EAU CLAIRE
FLOOD PLAIN MANAGEMENT STUDY
EAU CLAIRE COUNTY, WISCONSIN
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Designed
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Drawing No
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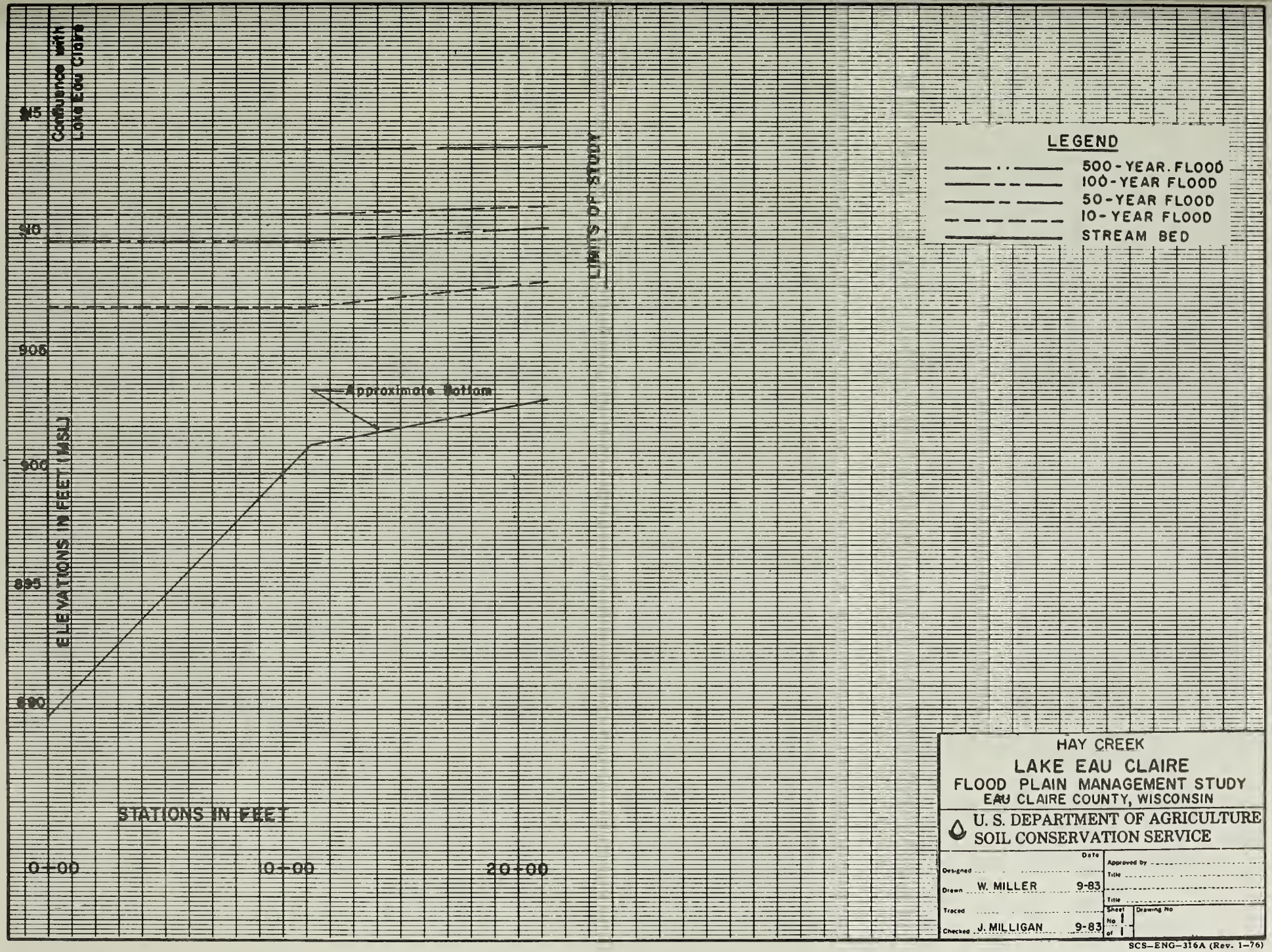


HAY CREEK

LAKE EAU CLAIRE

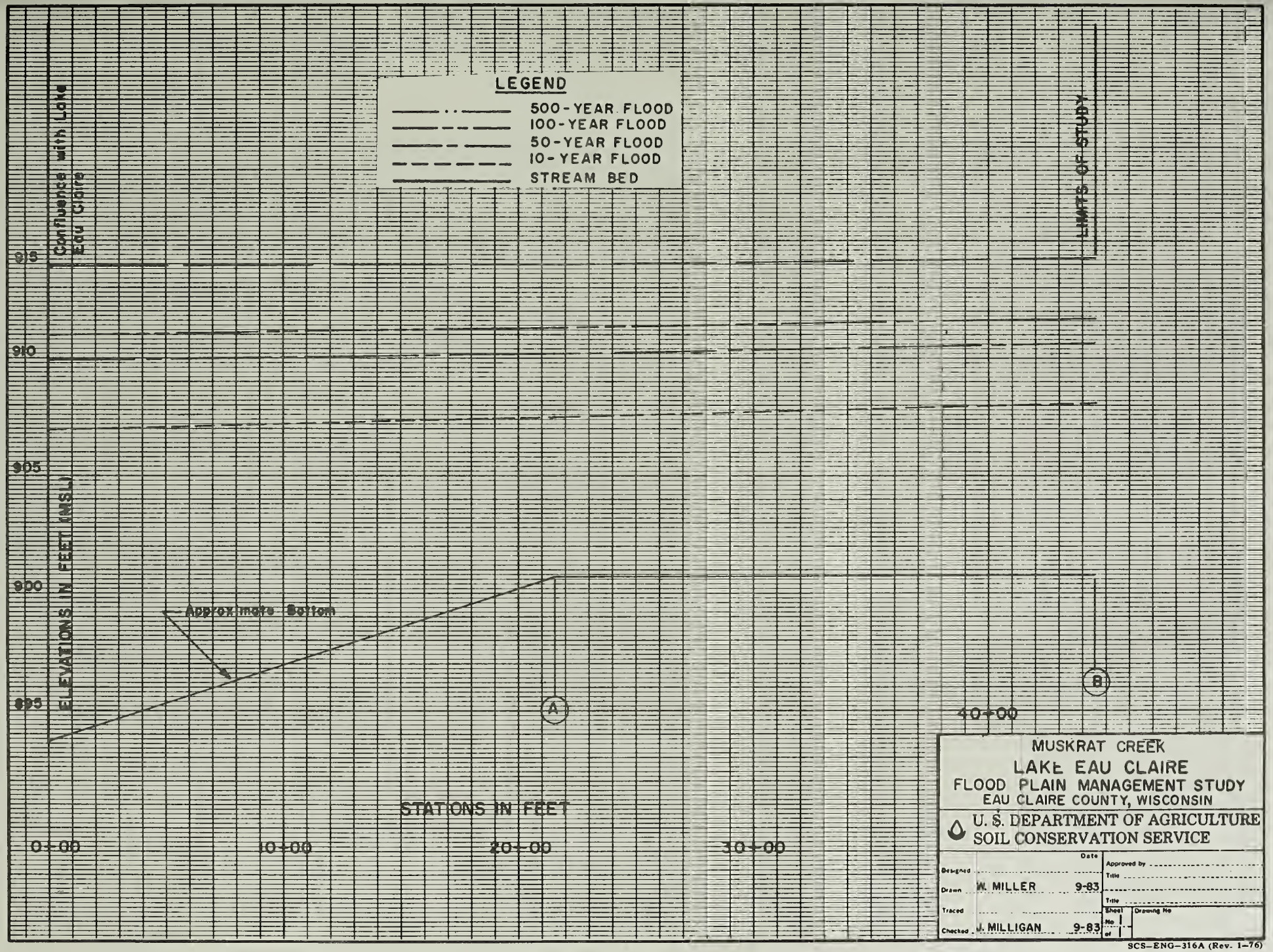
FLOOD PLAIN MANAGEMENT STUDY

EAU CLAIRE COUNTY, WISCONSIN

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

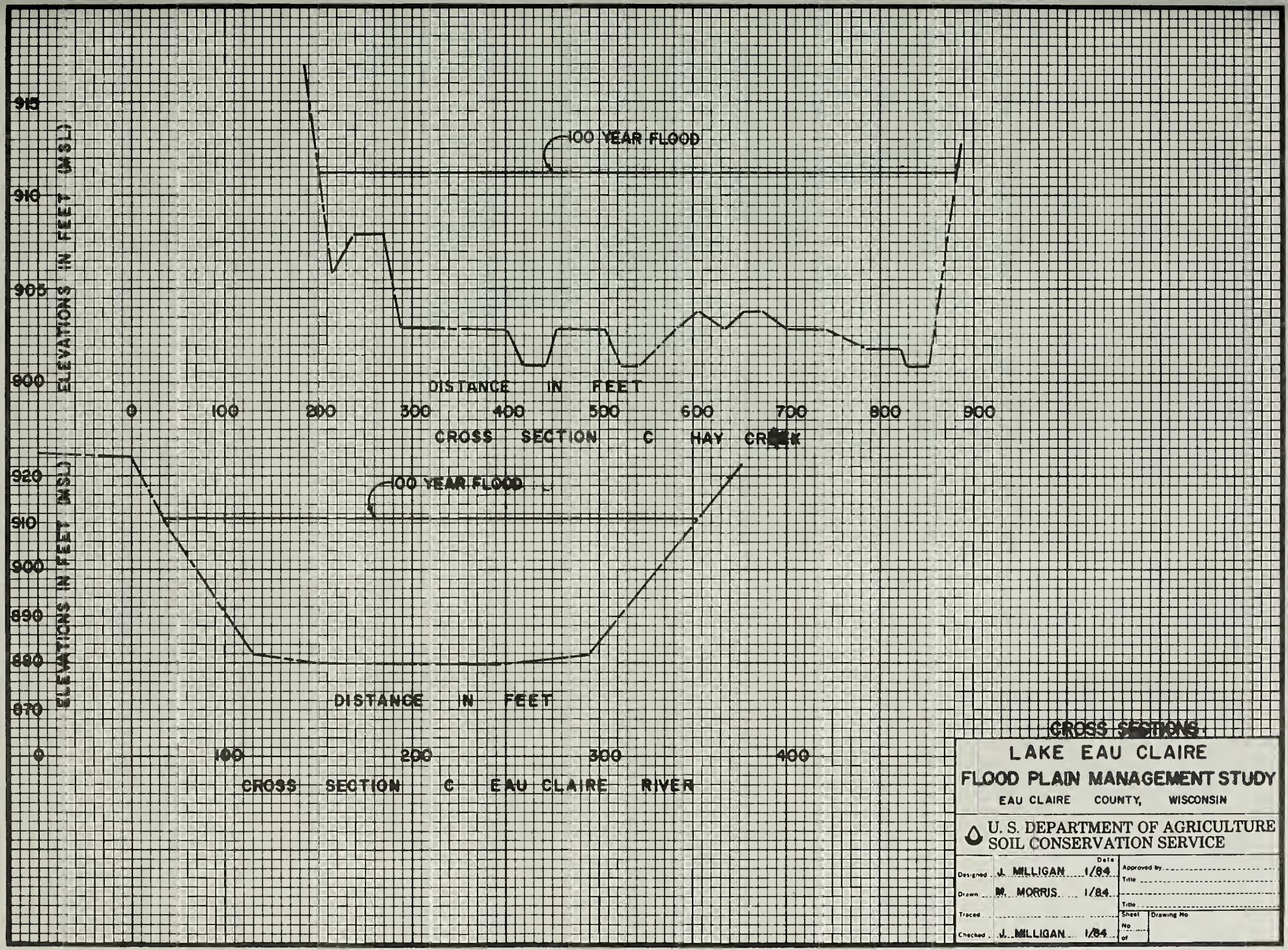
	Date		
Designed		Approved by	
Drawn W. MILLER	9-83	Title	
Traced		Title	
Checked J. MILLIGAN	9-83	Sheet No 1 of 1	Drawing No

SCS-ENG-316A (Rev. 1-76)


LEGEND
500-YEAR FLOOD
100-YEAR FLOOD
50-YEAR FLOOD
10-YEAR FLOOD
STREAM BED
Confluence with Lake Eau Claire
LIMITS OF STUDY
ELEVATIONS IN FEET (MSL)
915
910
905
900
895
Approximate Bottom
A
B
STATIONS IN FEET
0+00
10+00
20+00
30+00
40+00
MUSKRAT CREEK
LAKE EAU CLAIRE
FLOOD PLAIN MANAGEMENT STUDY
EAU CLAIRE COUNTY, WISCONSIN
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Designed
Drawn W. MILLER 9-83
Traced
Checked J. MILLIGAN 9-83
Date
Approved by
Title
Sheet No
Drawing No
SCS-ENG-316A (Rev. 1-76)

Appendix C

TYPICAL SECTIONS



C-1

SCS-ENG-315A 6-81

Appendix D

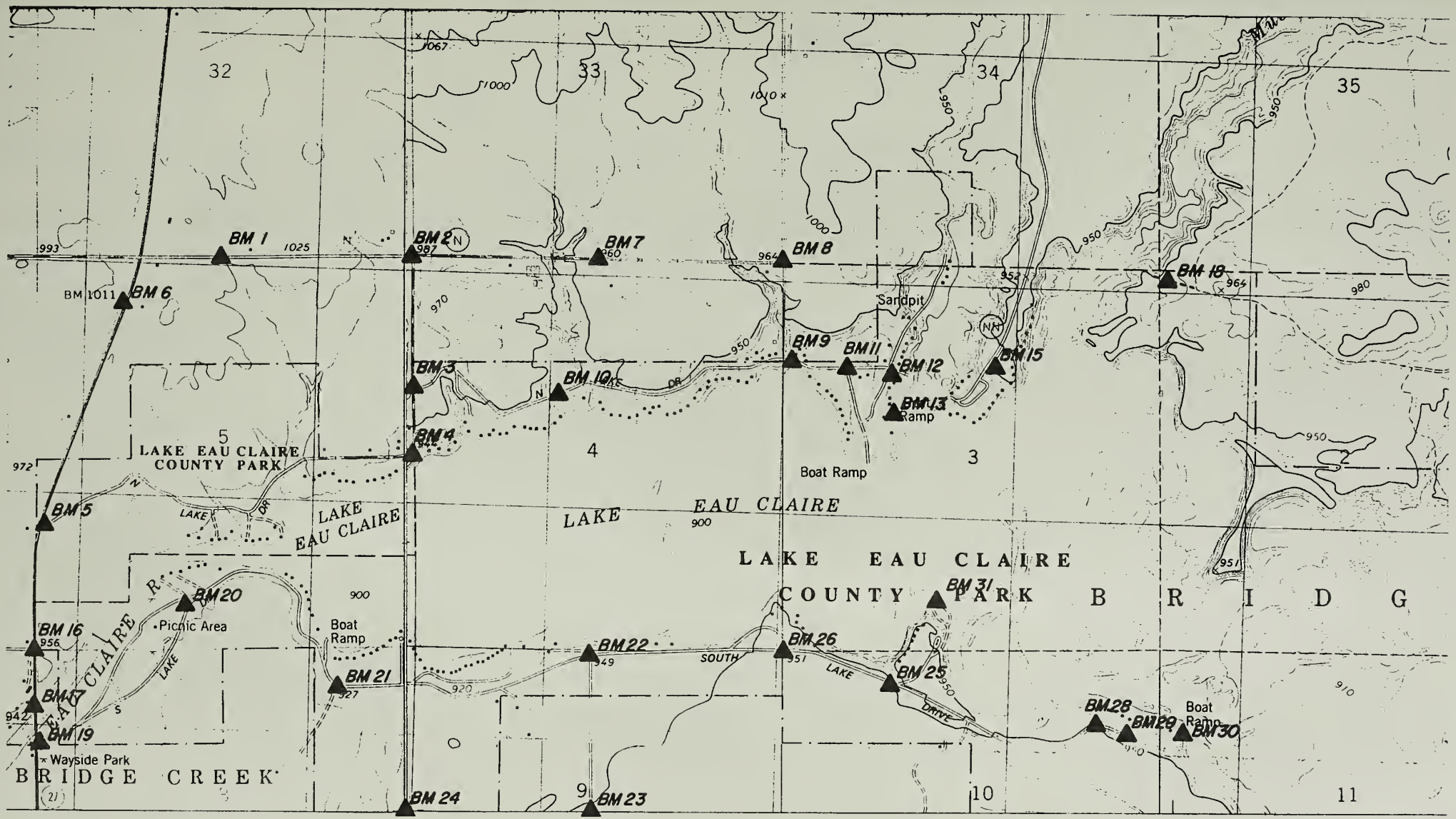
LIST OF BENCH MARKS

LIST OF BENCH MARKS

Bench Mark	Elev. (MSL)	Description
1	1006.87	Brass Cap N 1/4 of Section 5, T26N, R6W
2	990.24	Brass Cap NW of Section 4, T26N, R6W
3	973.28	Railroad spike in power pole 60' N & 33' W of intersection of east and south center lines of North Lake Drive
4		Destroyed
5	982.49	Railroad spike in 9" Oak Tree 150' E & 53' N of intersection of centerlines of North Lake Drive and Hyw "27" W side of tree up 0.7'
6	1010.77	Standard tablet in concrete stamped "TT17T 1949" 672' S & 82' W of intersection of centerlines of Hwy "27" & CTH "N"
7	961.18	Brass Cap @ N 1/2 of Section 4, T26N, R6W
8	963.53	NE corner of Section 4, T26N, R6W
9	910.88	Chiseled on downstream right wingwall of bridge 70' east of meander corner on west line of Section 3, T26N, R6W
10	918.69	Railroad spike in power pole #16, N side of North Lake Drive, first road west of beach by Fire #95-A @ bottom of hill
11	920.52	60^{d} spike in 4" x 4" sign post N side of North Lake Road @ Loop Road Public Boat Landing Sign
12	922.69	Railroad spike in power pole #78 in SE corner of Loop Road & North Lake Drive
13	907.07	60^{d} spike in yard light pole 30' W of water's edge, W across bay from Sugar's Landing
14		Destroyed
15	955.44	Top of 3" square concrete lot corner monument NW corner of Lot @ 33' E of centerline of CTH "NN", 26' N of centerline of driveway to # (#169-A)
16	955.84	Brass cap @ SE corner of Section 6, T26N, R6W

LIST OF BENCH MARKS

Bench Mark	Elev. (MSL)	Description
17	941.86	Chiseled on NW curb of bridge over Eau Claire River on STH "27"
18		Destroyed
19		Destroyed
20	933.13	Chiseled 1.5' S of flag pole @ E end of parking lot in County Park on Eau Claire River E of STH "27"
21	922.11	Railroad spike in 8" Jack Pine 33' N of centerline of South Lake Drive & 25' W of driveway to Fire #191-A 0.3' above ground
22	948.13	Top of monument @ S 1/4 corner of Section 4, T26N, R6W
23	950.02	Top of 1 1/4" iron pipe, center of Section 9, T26N, R6W 13' W of the E edge of Pine Drive
24	945.36	Brass cap @ W 1/2 corner of Section 9, T26N, R6W
25	952.27	Railroad spike in power pole 170' W & 30' S of intersection of Misty Ridge Road and S Lake Drive
26	951.07	Aluminum County Monument at SE corner of Section 4, T26N, R6W
27		Destroyed
28	953.47	60^{d} spike in power pole on curve at Skid Row (South Shore Drive) 25' N of centerline 25' E of 10 MPH sign @ top of hill
29	930.70	60^{d} spike in 14'Cottonwood Tree 30' N of centerline & 50' W of driveway for Fire #'s 242-A, 243-A, 244-A @ bottom of hill
30	909.57	Chiseled on SW. corner of concrete slab on privy at boat landing at E end of Lake Eau Claire
31	908.30	SE corner top of bottom step on house 0.1' above ground (westerly step) 30' W of SW corner of house Fire #240-A (S. Shore of Lake Eau Claire)



SCALE 1:24 000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

CONTOUR INTERVAL 10 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

LOCATION OF BENCH MARKS
LAKE EAU CLAIRE
FLOOD PLAIN MANAGEMENT STUDY
EAU CLAIRE COUNTY, WISCONSIN

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Appendix E

TABULATION OF
WATER SURFACE ELEVATIONS
AND
DISCHARGES

Flooding Source		Discharge - Elevation							
Cross-section	Distance 1/	10 year		50 year		100 year		500 year	
		Q CFS	Elev. MSL	Q CFS	Elev. MSL	Q CFS	Elev. MSL	Q CFS	Elev. MSL
Lake Eau Claire									
A	35	14200	906.9	22634	909.6	26700	910.6	37200	913.1
B	655	14200	907.0	22634	909.7	26700	910.8	37200	913.3
C	1480	14200	906.9	22634	909.7	26700	910.7	37200	913.3
D	2330	14200	907.0	22634	909.7	26700	910.8	37200	913.4
E	3250	14200	907.0	22634	909.9	26700	910.9	37200	913.6
F	3830	14200	907.1	22634	909.9	26700	911.0	37200	913.8
G	4740	14200	907.1	22634	909.9	26700	911.0	37200	913.8
H	6960	14200	907.1	22634	909.9	26700	911.0	37200	913.8
I	10060	14200	907.1	22634	909.9	26700	911.0	37200	913.8
J	11900	14200	907.1	22634	909.9	26700	911.0	37200	913.8
K	12850	14200	907.1	22634	909.9	26700	911.0	37200	913.8
L	14670	14200	907.1	22634	909.9	26700	911.0	37200	913.8
M	16510	14200	907.1	22634	909.9	26700	911.0	37200	913.8
Hay Creek 2/									
A	0	724	907.1	1250	909.9	1500	911.0	2090	913.8
B	1120	724	907.1	1250	909.9	1500	911.0	2090	913.8
C	2120	724	908.2	1250	910.5	1500	911.4	2090	913.9
Muskrat Creek 2/									
A	2150	1380	907.5	2370	910.2	2690	911.3	3760	914.0
B	3550	1380	908.1	2370	910.7	2690	911.7	3760	914.3

1/ Distance in feet above dam. 2/ Distance in feet from lake.

TABLE 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
LAKE EAU CLAIRE
FLOOD PLAIN MANAGEMENT STUDY
EAU CLAIRE COUNTY, WISCONSIN

DISCHARGE - ELEVATION DATA

LAKE EAU CLAIRE, HAY CREEK, MUSKRAT CREEK

Appendix F

INVESTIGATIONS AND ANALYSIS

Investigation and Analaysis

The flows through the lake and dam were determined by statistically analyzing the gage data for the US Geologic Survey gage located at Fall Creek (5366500) then transferring the data upstream by using a drainage area ratio. (1) The gage is located approximately 8.2 miles downstream from the Lake Eau Claire dam and has a drainage area of 760 square miles compared to 588 square miles at the lake outlet. The gage data was analysed using the procedures of Bulletin 17B(6) and zero skew, with the results correlated with Wisconsin DNR.

A stage discharge curve was computed for the dam, utilizing the overflow weirs and taintor gates. It was assumed the taintor gates would be fully open during a major flood. This assumption is based on the operating procedure outlined in document #2-WP-908 issued by the Public Service Commission of Wisconsin on February 24, 1953 and the Emergency Action Plan for Lake Altoona and Eau Claire dams dated March 1982. The operation of the gates have little effect on flood levels greater than the 10-year event.

A hydraulic model, used to compute the water surface for a given discharge, called WSP2 computer program (4), was used to determine the rise in the water surface due to the channel between the dam and the lake proper. This loss or head drop was found to be 0.4 feet. Adding this to the 10.9 feet required to push the water through the dam, the total rise in the lake is 11.3 feet or elevation 911.0 mean sea level.

The flows for Hay and Muskrat Creek were determined using the methodologies of National Engineering Handbook no. 4 Hydrology as set up in the TR20 Computer Program for Project Formulation Hydrology. To accomplish this the individual drainage areas had to be deliniated and measured, while doing this the additional area draining into the lake was deliniated and measured. Previous publications listed the total drainage area as approximate. Therefore, the additional effort was felt justified.

The water surfaces of Hay and Muskrat Creeks were computed starting with the previously computed lake elevations. Hay Creek was also run with the lake at normal level to determine if the creek alone would flood the properties along its banks upstream from the lake. It does not, the high lake gives the highest flooding in this area and is shown on the maps.

It was determined by the county and DNR that floodways would be of no advantage. Therefore floodways were not determined.

The cross section locations and regional flood lines are shown on the contour maps. The maps were developed through the State of Wisconsin Mapping Grant Program. These maps have been reduced and included as Appendix A. The full scale 1"=200' maps with flood lines have been furnished to the county. The profiles with water surface and cross section locations are in Appendix B.

Appendix G

GLOSSARY

GLOSSARY

CHAPTER NR. 116, WISCONSIN'S FLOOD PLAIN MANAGEMENT PROGRAM
NR. 116.03 DEFINITIONS

Channel. A channel is a natural or artificial watercourse with definite bed and banks to confine and conduct the normal flow of water.

Department. Department refers to the State of Wisconsin Department of Natural Resources.

Encroachment. An encroachment is any fill, structure, building, use, accessory use, or development in the floodway.

Encroachment/Floodway Lines. Encroachment/floodway lines are limits of obstruction to floodflows. These lines are on both sides of and generally parallel to the river or stream. The lines are established by assuming that the area landward (outside) of the encroachment/floodway lines will be ultimately developed in such a way that it will not be available to convey floodflows.

Equal Degree of Hydraulic Encroachment. The effect of any encroachment into the floodway must be computed by assuming an equal degree of hydraulic encroachment on the other side of a river or stream for a hydraulic reach. This computation assures that property owners up, down, or across the river or stream will have the same rights of hydraulic encroachment. Encroachments are analyzed on the basis of the effect upon hydraulic conveyance, not upon the distance the encroachment extends into the floodway. Also see: Hydraulic Reach.

Flood. A general and temporary condition of partial or complete inundation of normally dry land areas caused by the overflow or rise of rivers, streams, or lakes.

Flood Frequency. The term flood frequency is a means of expressing the probability of flood occurrences and is generally determined from statistical analyses. The frequency of a particular floodflow is usually expressed as occurring, on the average, once in a specified number of years. Any particular floodflow could, however, occur more frequently than once in any given year.

Flood Fringe. The flood fringe is that portion of the flood plain outside of the floodway, which is covered by floodwaters during the regional flood; it is generally associated with standing water rather than rapidly flowing water.

Flood Plain. The flood plain is the land which has been or may be hereafter covered by floodwater during the regional flood. The flood plain includes the floodway and the flood fringe.

Flood Plain Management. Flood plain management involves the full range of public policy and action for insuring wise use of flood plains. It includes everything from the collection and dissemination of flood control information to actual acquisition of flood plain lands; and the enactment and administration of codes, ordinances, and statutes for land use in the flood plain.

Flood Proofing. Flood proofing involves any combination of structural provisions, changes, or adjustments to properties and structures subject to flooding, primarily for the purpose of reducing or eliminating flood damage to properties, water and sanitary facilities, structures and contents of buildings in flood hazard areas.

Flood Protection Elevation. The flood protection elevation shall correspond to a point 2 feet of freeboard above the water surface profile associated with the regional flood and the official floodway lines. Also see: Freeboard.

Floodway. The floodway is the channel of a river or stream and those portions of the flood plain adjoining the channel required to carry and discharge the floodwater or floodflows associated with the regional flood.

Freeboard. Freeboard is a factor of safety usually expressed in terms of a certain amount of feet above a calculated flood level. Freeboard compensates for the many unknown factors that contribute to flood heights greater than the height calculated. These unknown factors include, but are not limited to, ice jams, debris accumulation, wave action, obstruction of bridge openings and floodways, the effects of urbanization on the hydrology of the watershed, loss of flood storage areas due to development and aggradation of the river or streambed.

High Flood Damage Potential. High flood damage potential is associated with any danger to life or health and any significant economic loss to a structure or building or its contents.

Hydraulic Floodway Lines. Hydraulic floodway lines shall delineate the channel of the river or stream and those portions of the adjoining flood plains which are reasonably required to carry and discharge the regional floodflow without any measurable increase in flood heights.

Hydraulic Reach. A hydraulic reach along a river or stream is that portion of the river or stream extending from one significant change in the hydraulic character of the river or stream to the next significant change. These changes are usually associated with breaks in the slope of the water surface profile, and may be caused by bridges, dams, expansion and contraction of the waterflow, and changes in streambed slope or vegetation.

Levee. A levee is a continuous dike or embankment of earth constructed parallel to a river or stream to prevent flooding of certain areas of land.

Official Floodway Lines. Official floodway lines are those lines which have been adopted by the county, city, or village, approved by the department, and which are shown on the official flood plain zoning maps and used for regulatory purposes.

Regional Flood. The regional flood is a flood determined to be representative of large floods known to have generally occurred in Wisconsin and which may be expected to occur on a particular stream because of like physical characteristics. The regional flood is based upon a statistical analysis of streamflow records available for the watershed and/or an analysis of rainfall and runoff characteristics in the general watershed region. The flood frequency of the regional flood is once in every 100 years; this means that in any given year there is a 1 percent chance that the regional flood may occur. During a typical 30-year mortgage period, the regional flood has a 26 percent chance of occurring.

Structure. A structure is any manmade object with form, shape, and utility, either permanently or temporarily attached to or placed upon the ground, riverbed, streambed, or lakebed.

Watershed. A watershed is a region or area contributing ultimately to the water supply of a particular watercourse or body of water.

Water Surface Profile. The water surface profile is a graphical representation of the height of the water surface throughout a county, city, or village based upon a certain flow passing through the river or stream. A water surface profile based upon flows occurring during a regional flood is used in regulating the flood plain areas.

Appendix H

BIBLIOGRAPHY

Bibliography and Related References

1. Conger, Duane H., Techniques for Estimating Magnitude and Frequency of Floods for Wisconsin Streams, U.S. Department of the Interior, Geological Survey, Water Resources Division, Madison, Wisconsin, 1981.

2. State of Wisconsin, Blue Book, Wisconsin Legislative Reference Bureau, 1975.

3. USDA, Soil Conservation Service, Computer Program for Project Formulation Hydrology Technical Release No. 20, Washington, D.C., May 1965.

4. USDA, Soil Conservation Service, WSP-2 Computer Program, Technical Release No. 61, May 1976.

5. Shaw & Fredine, 1956. Wetlands of the United States. United States Department of Interior, Fish and Wildlife Service, Circular 39, 67 pages.

6. Interagency Advisory Committee on Water Data. Guidelines for Determining Flood Flow Frequency, Bulletin #17B, March 1982, U.S. Department of the Interior Geological Survey, Office of Water Data Coordination.